

Opening up energy data: an introduction to Open Source

The energy industry creates a huge amount of data, spewing from meters, transformed by billing systems and fed into management systems. Yet energy specialists often reach for Microsoft Excel whenever they need to do some analysis. Karthik Suresh presents some alternative options to crunch the energy numbers

The Excel approach has worked for several years and you can do a lot with a line chart and a ‘Mark I’ eyeball but there are more options for energy managers who want to go further.

A natural step is to think you need some kind of fancy system. Perhaps a Software As A Service (SAAS) platform that does everything. Maybe one that uses machine learning and artificial intelligence to make your job irrelevant.

But such grand solutions rarely seem to address the specific problem you have right now. Instead of kicking off a large, complex IT project, can you do something that is simple and useful right now? That’s where Open Source comes in.

The Open Source movement has resulted in creating much of the software that runs global networks behind the scenes. While our personal computers are still dominated by Microsoft, there is a world of software out there available for free that can help you create simple and useful systems if you are willing to spend the time to learn how to use it.

For many people that journey starts by exploring programming in the R statistical language or the Python programming language. You can install both on Windows and, with very little effort, do some quite complex analysis.

For example, Figure 1 shows historic market prices going back to 2005 and uses the daily variation to make a forecast of what could happen to prices and projects a central case – the black line. The program for this chart is about 15 lines of Python. Creating something equivalent in Excel would be a non-trivial task.

The sharp-eyed ones among you will notice that the analysis was run in October and predicted a downturn in prices – something that has actually happened recently.

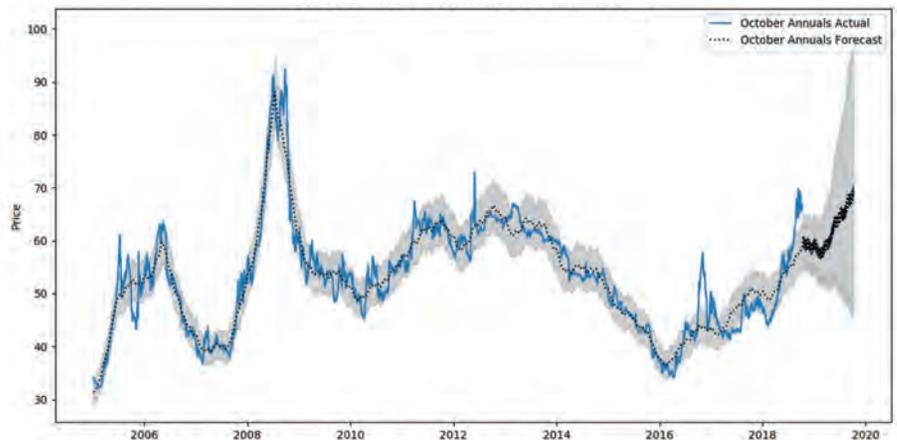


Figure 1: Forecasting energy prices using Open Source

MPAN	Days	Zeroes	Zeroes (%)	Total	Min	Average	Max
XXXXXXXX	30	0	0.00	106473.10	7.60	73.94	97.20
XXXXXXXX	30	0	0.00	39471.90	0.10	27.41	48.60
XXXXXXXX	30	0	0.00	55568.90	3.00	38.59	41.20
XXXXXXXX	30	0	0.00	31634.35	0.06	21.97	27.03
XXXXXXXX	30	0	0.00	28420.00	7.10	19.74	35.40
XXXXXXXX	30	0	0.00	293607.00	4.80	203.89	251.20
XXXXXXXX	30	0	0.00	11920.79	1.85	8.28	19.56
XXXXXXXX	30	0	0.00	3958.49	0.30	2.75	10.10
XXXXXXXX	30	0	0.00	34187.23	0.08	23.74	29.34
XXXXXXXX	30	22	1.53	11272.90	0.10	7.83	14.20
XXXXXXXX	30	0	0.00	7900.10	2.10	5.49	70.40
XXXXXXXX	30	0	0.00	9390.30	0.13	6.52	10.06
XXXXXXXX	30	0	0.00	5602.20	2.40	3.89	5.50
XXXXXXXX	30	0	0.00	33850.70	0.50	23.51	35.90
XXXXXXXX	30	0	0.00	14511.80	1.30	10.08	48.90
XXXXXXXX	30	0	0.00	34417.90	2.80	23.90	36.60
XXXXXXXX	30	0	0.00	985466.40	164.50	684.35	916.70
XXXXXXXX	30	0	0.00	577.32	0.01	0.40	18.24
XXXXXXXX	30	0	0.00	13246.70	5.90	9.20	13.10

Figure 2: Using Open Source to manage half-hourly data outputs

Another task many of us do on a daily basis is slice and dice tabular data like half-hourly metering data. For example, let’s say you want some basic statistics about your data set and check that there are no zeroes for a portfolio of a few hundred sites before you use the data for ESOS (see Figure 2). A

program can do this for hundreds or thousands of sites in less time than it will take for a spreadsheet to open.

Writing programs such as these requires getting familiar with a different interface and way of working than the traditional application approach where you press buttons and make things happen. The

command line – that old DOS-like box – that many think is dead is actually where much real work gets done.

If you have never done any programming the learning gap can seem huge but, in reality, the amount of information and support for Open Source technologies has never been greater.

There is no other field where so much is out in the open. The Open Source movement and the Free Software Foundation have long believed that software should be open – that it should give users freedoms – to study, modify and share source code.

Most commercial software, on the other hand, is designed to take away freedom. It is designed to be sticky – the more you depend on it the less control you have and the more power the supplier has over you.

That is not a bad thing when you trust each other. But perhaps one of the reasons why Microsoft Excel is so widely used is because everyone can use it, program it and see how spreadsheets are built. Although it is a commercial software product, the openness built from calculations in cells reduces your risk of losing control over the data and calculations that matter to you.

A related benefit of learning to program is that once you write a program to do something automation becomes much easier. You can schedule that program to run daily or weekly to do the analysis that would otherwise involve you opening and editing a spreadsheet manually.

So, where should you start? If you

have a computer the first step for most people is to install a copy of a GNU/Linux operating system, often available with one of the Linux magazines at the local supermarket. You might have recently heard that IBM bought Red Hat Linux – and I installed one of their distributions for the first time in 1998. IBM's decision shows how pivotal it thinks Open Source will be for it in the future.

These days many go for Ubuntu as a starting point or, if you are braver, start with one of the distributions optimised

for statistical and scientific work. You can even

install Ubuntu under Windows or run it entirely from a disc or USB drive without installing it on your computer at all.

The main thing, if you would like to learn more, is to get started. If you are aware that Open Source options exist you can start building your own software or find that one of the numerous packages out there can be adapted to what you need. For example, there are packages that offer energy monitoring, facility management and CRM capabilities, just to name a few.

There really are very few limits to what you can do once you start to use Open Source systems. For those of us who wrestle with data on a daily basis, they make it simple to do simple tasks, and make complex tasks possible.

Some useful links to find out more are python.org, r-project.org and ubuntu.com **te**

42nd World Energy Engineering Congress (WEEC) - Association of Energy Engineers Call for 2019 Regional Award Nominations

Deadline 22 February

Regional Awards (open to international energy managers/professionals) will be presented on 25 September 25 in Washington, DC, at the 42nd World Energy Engineering Congress (WEEC). If you know individuals, organisations, agencies, corporations or institutions in your region that are doing outstanding work in energy, make sure they are nominated for this year's awards. To learn more about the Regional Awards Program and to see award categories, visit aeecenter.org/regionalawards.

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